M/710 Firing Pin Head Camming Tab Bend Test

May 8, 2000

Introduction / Summary

The strength of the camming tab on the M/710 Firing Pin Head was evaluated on the current prototype machined 4140 parts and the production MIM parts. This was done to determine if the production parts would as strong as the prototype parts that are currently in test. A test was setup on the Instron 8502 servo-hydraulic testing machine to uniformly hold the firing pin heads and break off the camming tab in a sideways bending fashion.

Five prototype 4140 part and six production MIM parts were tested. The average maximum load required to break off the camming tab on the 4140 parts was 645 pounds while the average max load required to bread the MIM parts was 708 pounds.

Setup

A fixture was made to hold the firing pin heads in repeatable consistent manner. A steel plated was inletted to hold the firing pin head with a firing pin body screwed into it from the opposite side of the camming tab. This fixture was then clamped to the Inston's work table so that when each part was changed out it would be in the exact same position in relation to the punch as the last part. Figures 1 and 2 show the fixturing setup.

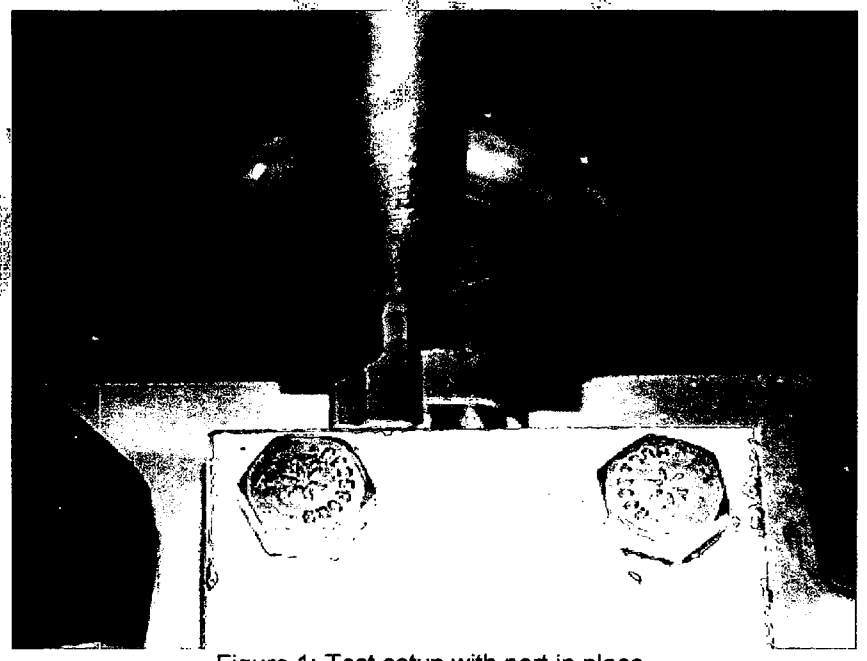

Figure 1: Test setup with part in place.

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Engineer

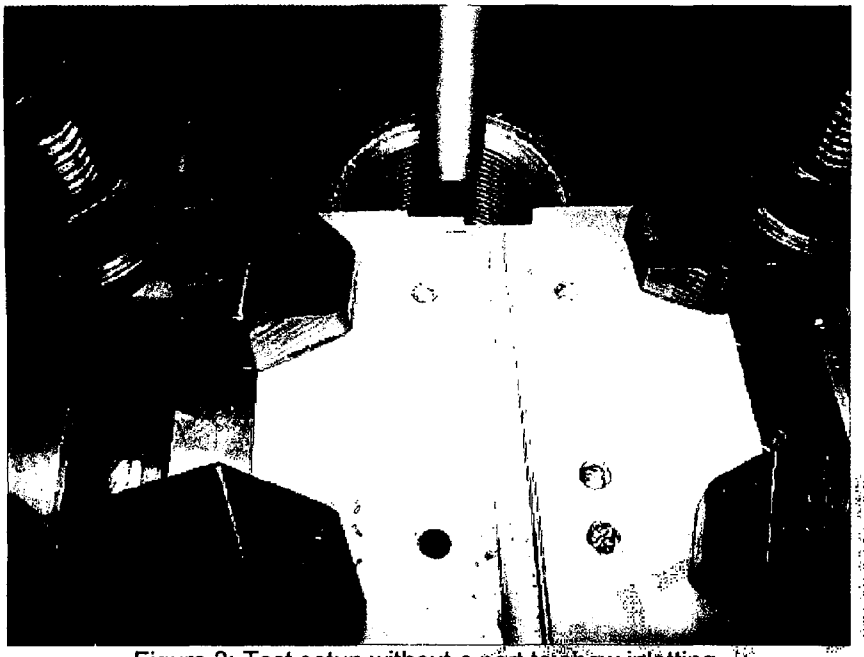

Figure 2: Test setup without a part to show inletting.

Results

Five prototype 4140 part and six production MIM parts were tested. The peak load results can be seen in Table 1. The average maximum load required to break off the camming tab on the 4140 parts was 645 pounds while the average max load required to bread the MIM parts was 708 pounds.

Material	4140	MIM
Individual Peak Load	544.84	696.42
	576.36	644.8
	701.48	703.22
	741.21	760.79
	662.28	715.77
		726.31
Average	645.23	707.89

Table 1: Peak load results for the 4140 and MIM parts.

The load versus displacement data was graphed and can be seen in Figure 3. This data is unmodified and was not shifted to make all of the graphs start at the same point. This was done because the punch was moved through a fixed displacement for each sample. The difference in the starting points for the samples represents a difference in when the punch contacts the tip of the camming tab which means that there is a difference in the thickness of the camming tabs. All of the 4140 samples measured 0.170" and the MIM samples measured 0.167. There are two anomalies in the data that are note worthy. The first, marked as note 1 in figure 3, is most likely a result of the sample being slightly rotated up in the fixture and being push into place at the test

proceeded. The second anomaly, marked as note 2 in figure 3, was caused simply by the part not breaking cleanly. The last thing to note is that the modulus of the MIM parts appear to be slightly lower than the 4140. However, this should not cause any problems.

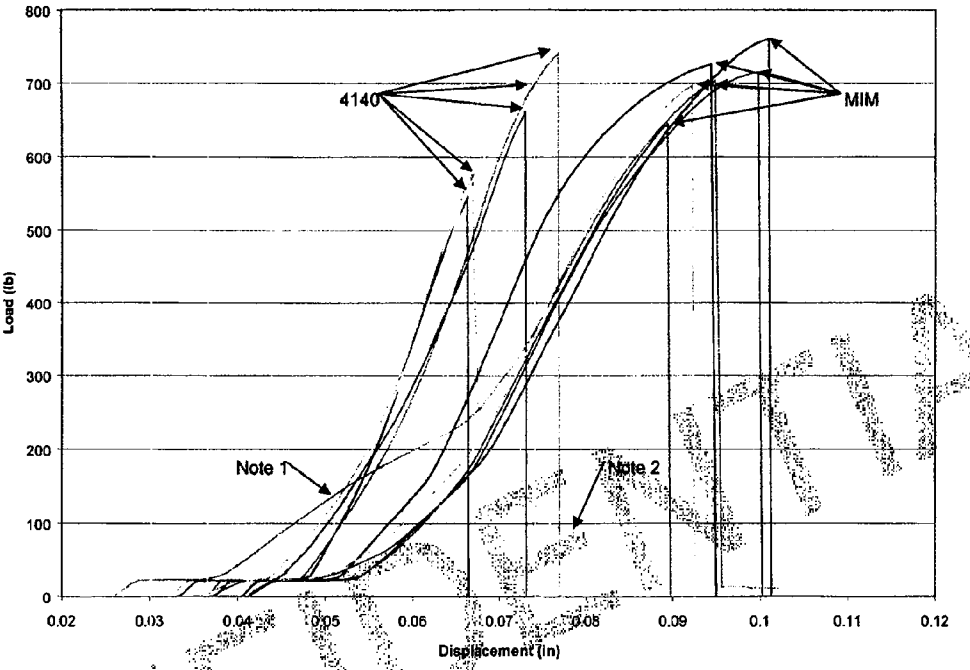

Figure 3: Load vs. Displacement results for the 4140 and MIM parts.